

Application No. 10/003,912
Amendment dated July 23, 2004
Reply to Office Action of January 22, 2004 and Notice of Non-Compliant Amendment of July 1, 2004

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Claim 1 (currently amended) A heat transfer fluid mixture consisting essentially of a heavy gas selected from the group consisting of nitrogen, argon, carbon dioxide, and mixtures thereof, and a light gas selected from the group consisting of hydrogen, helium, and any mixture thereof.

Claim 2 (currently amended) The heat transfer fluid mixture of claim 1 wherein the light gas hydrogen has a concentration ranging from about 20 mole percent to about 99 mole percent.

Claim 3 (currently amended) The heat transfer fluid mixture of claim 1 wherein the light gas hydrogen has a concentration ranging from about 30 mole percent to about 98 mole percent.

Claim 4 (currently amended) The heat transfer fluid mixture of claim 1 wherein the light gas hydrogen has a concentration ranging from about 40 mole percent to about 97 mole percent.

Claim 5 (currently amended) The heat transfer fluid mixture of claim 1 wherein the light gas hydrogen has a concentration ranging from about 50 mole percent to about 96 mole percent.

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Claim 6 (currently amended) The heat transfer fluid mixture of claim 1 wherein the light-gas hydrogen has a concentration ranging from about 60 mole percent to about 95 mole percent.

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Claim 7 (currently amended) The heat transfer fluid mixture of claim 1 wherein the heavy-gas argon has a concentration ranging from about 1 mole percent to about 99 mole percent.

Claim 8 (withdrawn) A method of cooling an item, the method comprising contacting the item with the mixture of claim 1, said contacting selected from the group consisting of directly contacting the item, indirectly contacting the item, and combinations thereof.

Claim 9 (withdrawn) A method of cooling an item, the method comprising contacting the item with the mixture of claim 2, said contacting selected from the group consisting of directly contacting the item, indirectly contacting the item, and combinations thereof.

Claim 10 (withdrawn) A method of cooling an item, the method comprising contacting the item with the mixture of claim 3, said contacting selected from the group consisting of directly contacting the item, indirectly contacting the item, and combinations thereof.

Claim 11 (withdrawn) A method of cooling an item, the method comprising contacting the item with the mixture of claim 4, said contacting selected from the group consisting of directly contacting the item, indirectly contacting the item, and combinations thereof.

Claim 12 (withdrawn) A method of cooling an item, the method comprising contacting the item with the mixture of claim 5, said contacting selected from the group consisting of directly contacting the item, indirectly contacting the item, and combinations thereof.

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Claim 13 (withdrawn) A method of cooling an item, the method comprising contacting the item with the mixture of claim 6, said contacting selected from the group consisting of directly contacting the item, indirectly contacting the item, and combinations thereof.

Claim 14 (withdrawn) A method of heating an item, the method comprising contacting the item with the mixture of claim 1, said contacting selected from the group consisting of directly contacting the item, indirectly contacting the item, and combinations thereof.

Claim 15 (withdrawn) A method of heating an item, the method comprising contacting the item with the mixture of claim 2, said contacting selected from the group consisting of directly contacting the item, indirectly contacting the item, and combinations thereof.

Claim 16 (withdrawn) A method of heating an item, the method comprising contacting the item with the mixture of claim 3, said contacting selected from the group consisting of directly contacting the item, indirectly contacting the item, and combinations thereof.

Claim 17 (withdrawn) A method of heating an item, the method comprising contacting the item with the mixture of claim 4, said contacting selected from the group consisting of directly contacting the item, indirectly contacting the item, and combinations thereof.

Claim 18 (withdrawn) A method of heating an item, the method comprising contacting the item with the mixture of claim 5, said contacting selected from the group consisting of directly contacting the item, indirectly contacting the item, and combinations thereof.

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Claim 19 (withdrawn) A method of heating an item, the method comprising contacting the item with the mixture of claim 6, said contacting selected from the group consisting of directly contacting the item, indirectly contacting the item, and combinations thereof.

Claim 20 (withdrawn) A method of cooling an item traversing through a substantially confined space, the method comprising contacting the item with the mixture of claim 1, said contacting selected from the group consisting of directly contacting the item, indirectly contacting the item, and combinations thereof.

Claim 21 (withdrawn) A method of cooling an item traversing through a substantially confined space, the method comprising contacting the item with the mixture of claim 2, said contacting selected from the group consisting of directly contacting the item, indirectly contacting the item, and combinations thereof.

Claim 22 (withdrawn) A method of cooling an item traversing through a substantially confined space, the method comprising contacting the item with the mixture of claim 3, said contacting selected from the group consisting of directly contacting the item, indirectly contacting the item, and combinations thereof.

Claim 23 (withdrawn) A method of cooling an item traversing through a substantially confined space, the method comprising contacting the item with the mixture of claim 4, said contacting selected from the group consisting of directly contacting the item, indirectly contacting the item, and combinations thereof.

Claim 24 (withdrawn) A method of cooling an item traversing through a substantially confined space, the method comprising contacting the item with the mixture of claim 5, said contacting selected from the group consisting of directly contacting the item, indirectly contacting the item, and combinations thereof.

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Claim 25 (withdrawn) A method of cooling an item traversing through a substantially confined space, the method comprising contacting the item with the mixture of claim 6, said contacting selected from the group consisting of directly contacting the item, indirectly contacting the item, and combinations thereof.

Claim 26 (withdrawn) A method of heating an item traversing through a substantially confined space, the method comprising contacting the item with the mixture of claim 1, said contacting selected from the group consisting of directly contacting the item, indirectly contacting the item, and combinations thereof.

Claim 27 (withdrawn) A method of heating an item traversing through a substantially confined space, the method comprising contacting the item with the mixture of claim 2, said contacting selected from the group consisting of directly contacting the item, indirectly contacting the item, and combinations thereof.

Claim 28 (withdrawn) A method of heating an item traversing through a substantially confined space, the method comprising contacting the item with the mixture of claim 3, said contacting selected from the group consisting of directly contacting the item, indirectly contacting the item, and combinations thereof.

Claim 29 (withdrawn) A method of heating an item traversing through a substantially confined space, the method comprising contacting the item with the mixture of claim 4, said contacting selected from the group consisting of directly contacting the item, indirectly contacting the item, and combinations thereof.

Claim 30 (withdrawn) A method of heating an item traversing through a substantially confined space, the method comprising contacting the item with the mixture of claim 5, said contacting selected from the group consisting of directly contacting the item, indirectly contacting the item, and combinations thereof.

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Claim 31 (withdrawn) A method of heating an item traversing through a substantially confined space, the method comprising contacting the item with the mixture of claim 6, said contacting selected from the group consisting of directly contacting the item, indirectly contacting the item, and combinations thereof.

Claim 32 (withdrawn) A method of cooling a substantially cylindrical item traversing through a substantially confined space, the method comprising contacting the substantially cylindrical item with the mixture of claim 1, said contacting selected from the group consisting of directly contacting the item, indirectly contacting the item, and combinations thereof.

Claim 33 (withdrawn) A method of cooling a substantially cylindrical item traversing through a substantially confined space, the method comprising contacting the substantially cylindrical item with the mixture of claim 2, said contacting selected from the group consisting of directly contacting the item, indirectly contacting the item, and combinations thereof.

Claim 34 (withdrawn) A method of cooling a substantially cylindrical item traversing through a substantially confined space, the method comprising contacting the substantially cylindrical item with the mixture of claim 3, said contacting selected from the group consisting of directly contacting the item, indirectly contacting the item, and combinations thereof.

Claim 35 (withdrawn) A method of cooling a substantially cylindrical item traversing through a substantially confined space, the method comprising contacting the substantially cylindrical item with the mixture of claim 4, said contacting selected from the group consisting of directly contacting the item, indirectly contacting the item, and combinations thereof.

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Claim 36 (withdrawn) A method of cooling a substantially cylindrical item traversing through a substantially confined space, the method comprising contacting the substantially cylindrical item with the mixture of claim 5, said contacting selected from the group consisting of directly contacting the item, indirectly contacting the item, and combinations thereof.

Claim 37 (withdrawn) A method of cooling a substantially cylindrical item traversing through a substantially confined space, the method comprising contacting the substantially cylindrical item with the mixture of claim 6, said contacting selected from the group consisting of directly contacting the item, indirectly contacting the item, and combinations thereof.

Claim 38 (withdrawn) A method of heating a substantially cylindrical item traversing through a substantially confined space, the method comprising contacting the substantially cylindrical item with the mixture of claim 1, said contacting selected from the group consisting of directly contacting the item, indirectly contacting the item, and combinations thereof.

Claim 39 (withdrawn) A method of heating a substantially cylindrical item traversing through a substantially confined space, the method comprising contacting the substantially cylindrical item with the mixture of claim 2, said contacting selected from the group consisting of directly contacting the item, indirectly contacting the item, and combinations thereof.

Claim 40 (withdrawn) A method of heating a substantially cylindrical item traversing through a substantially confined space, the method comprising contacting the substantially cylindrical item with the mixture of claim 3, said contacting selected from the group consisting of directly contacting the item, indirectly contacting the item, and combinations thereof.

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Claim 41 (withdrawn) A method of heating a substantially cylindrical item traversing through a substantially confined space, the method comprising contacting the substantially cylindrical item with the mixture of claim 4, said contacting selected from the group consisting of directly contacting the item, indirectly contacting the item, and combinations thereof.

Claim 42 (withdrawn) A method of heating a substantially cylindrical item traversing through a substantially confined space, the method comprising contacting the substantially cylindrical item with the mixture of claim 5, said contacting selected from the group consisting of directly contacting the item, indirectly contacting the item, and combinations thereof.

Claim 43 (withdrawn) A method of heating a substantially cylindrical item traversing through a substantially confined space, the method comprising contacting the substantially cylindrical item with the mixture of claim 6, said contacting selected from the group consisting of directly contacting the item, indirectly contacting the item, and combinations thereof.

Claim 44 (withdrawn) A method of cooling a substantially cylindrical optical fiber traversing through a heat exchanger, the method comprising contacting the optical fiber with the mixture of claim 1, said contacting selected from the group consisting of directly contacting the item, indirectly contacting the item, and combinations thereof.

Claim 45 (withdrawn) A method of cooling a substantially cylindrical optical fiber traversing through a heat exchanger, the method comprising contacting the optical fiber with the mixture of claim 2, said contacting selected from the group consisting of directly contacting the item, indirectly contacting the item, and combinations thereof.

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Claim 46 (withdrawn) A method of cooling a substantially cylindrical optical fiber traversing through a heat exchanger, the method comprising contacting the optical fiber with the mixture of claim 3, said contacting selected from the group consisting of directly contacting the item, indirectly contacting the item, and combinations thereof.

Claim 47 (withdrawn) A method of cooling a substantially cylindrical optical fiber traversing through a heat exchanger, the method comprising contacting the optical fiber with the mixture of claim 4, said contacting selected from the group consisting of directly contacting the item, indirectly contacting the item, and combinations thereof.

Claim 48 (withdrawn) A method of cooling a substantially cylindrical optical fiber traversing through a heat exchanger, the method comprising contacting the optical fiber with the mixture of claim 5, said contacting selected from the group consisting of directly contacting the item, indirectly contacting the item, and combinations thereof.

Claim 49 (withdrawn) A method of cooling a substantially cylindrical optical fiber traversing through a heat exchanger, the method comprising contacting the optical fiber with the mixture of claim 6, said contacting selected from the group consisting of directly contacting the item, indirectly contacting the item, and combinations thereof.

Claim 50 (withdrawn) A method of improving the cooling of a substantially cylindrical optical fiber traversing through a heat exchange device, the method comprising the steps of: contacting the optical fiber with the heat transfer fluid mixture of claim 1, said contacting selected from the group consisting of directly contacting, indirectly contacting, and combinations thereof; and making an adjustment, either intermittently or continuously, of a parameter during the

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cooling, the parameter selected from the group consisting of composition of the heat transfer fluid mixture, flow rate of the heat transfer fluid mixture into the heat exchange device, an amount of heat transfer fluid mixture contacting the fiber in counter-current fashion, an amount of heat transfer fluid mixture contacting the fiber in co-current fashion, composition of the heat transfer fluid mixture contacting the fiber in counter-current fashion, composition of the heat transfer fluid mixture contacting the fiber in co-current fashion, a temperature of the heat transfer fluid mixture being injected into the heat exchange device, a temperature of the heat transfer fluid mixture before contacting the fiber in counter-current fashion, a temperature of the heat transfer fluid mixture during contacting the fiber in counter-current fashion, a temperature of the heat transfer fluid mixture after contacting the fiber in counter-current fashion, a temperature of the heat transfer fluid mixture before contacting the fiber in a co-current fashion, a temperature of the heat transfer fluid mixture during contacting the fiber in a co-current fashion, a temperature of the heat transfer fluid mixture after contacting the fiber in a co-current fashion, a pressure of the heat transfer fluid mixture injected into the heat exchange device, a pressure of the heat transfer fluid mixture contacting the fiber in countercurrent fashion, and a pressure of the heat transfer fluid mixture contacting the fiber in a co-current fashion.

Claim 51 (withdrawn) A method of improving cooling of an object in contact with a stagnant or flowing gas mixture in a confined space, the method comprising the steps of:

contacting the object with the heat transfer fluid mixture of claim 1, said contacting selected from the group consisting of directly contacting, indirectly contacting, and combinations thereof; and

making an adjustment, either intermittently or continuously, of a parameter during the cooling process, the parameter selected from the group consisting

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of a composition of the heat transfer fluid mixture, a flow rate of the heat transfer fluid mixture in contact with the object, an amount of heat transfer fluid mixture contacting the object, a composition of the heat transfer fluid mixture contacting the object, a temperature of the heat transfer fluid injected into the confined space, a temperature of the heat transfer fluid mixture before contacting the object, a temperature of the heat transfer fluid mixture during contacting the object, a temperature of the heat transfer fluid mixture after contacting the object, a pressure of the heat transfer fluid mixture entering the confined space, and a pressure of the heat transfer fluid mixture contacting the object.

Claim 52 (withdrawn) The method of claim 51 wherein said parameter adjustment is made automatically or manually based upon a measured parameter of the object that changes during the cooling process.

Claim 53 (withdrawn) A method of improving heating of an object in contact with a stagnant or flowing gas mixture in a confined space, the method comprising:

contacting the object with the heat transfer fluid mixture of claim 1, said contacting selected from the group consisting of directly contacting, indirectly contacting, and combinations thereof; and

making an adjustment, either intermittently or continuously, of a parameter during the heating process, the parameter selected from the group consisting of a composition of the heat transfer fluid mixture, a flow rate of the heat transfer fluid mixture in contact with the object, an amount of heat transfer fluid mixture contacting the object, a composition of the heat transfer fluid mixture contacting the object, a temperature of the heat transfer fluid injected into the confined space, a temperature of the heat transfer fluid mixture before contacting the object, a temperature of the heat transfer fluid mixture

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during contacting the object, a temperature of the heat transfer fluid mixture
after contacting the object, a pressure of the heat transfer fluid mixture
entering the confined space, and a pressure of the heat transfer fluid mixture
contacting the object.

Claim 54 (withdrawn) The method of claim 53 wherein said parameter
adjustment is made automatically or manually based upon a measured
parameter of the object that changes during the heating process.

Claim 55 (withdrawn) A method of making a heat transfer fluid, the heat transfer
fluid adjustable between a first composition having high heat transfer coefficient
and high cost of use, and a second composition having essentially the same heat
transfer coefficient as the first composition but allowing reduced cost of use, the
method comprising the steps of:

Claim 56 (withdrawn) providing a light gas selected from the group consisting of
hydrogen, helium, and mixtures thereof, from a light gas source;

providing a heavy gas selected from the group consisting of nitrogen,
argon, carbon dioxide, and mixtures thereof, from a heavy gas source;

ascertaining a heating or cooling demand; and

combining the light gas and the heavy gas based on said demand.

Claim 57 (withdrawn) The method of claim 55 wherein said demand is a cooling
demand.

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Claim 58 (new) A heat transfer fluid mixture consisting essentially of helium and a heavy gas selected from the group consisting of nitrogen, carbon dioxide, and mixtures thereof.

Claim 59 (new) The heat transfer fluid mixture of claim 58 wherein the helium has a concentration ranging from about 20 mole percent to about 99 mole percent.

Claim 60 (new) The heat transfer fluid mixture of claim 58 wherein the helium has a concentration ranging from about 30 mole percent to about 98 mole percent.

Claim 61 (new) The heat transfer fluid mixture of claim 58 wherein the helium has a concentration ranging from about 40 mole percent to about 97 mole percent.

Claim 62 (new) The heat transfer fluid mixture of claim 58 wherein the helium has a concentration ranging from about 50 mole percent to about 96 mole percent.

Claim 63 (new) The heat transfer fluid mixture of claim 58 wherein the helium has a concentration ranging from about 60 mole percent to about 95 mole percent.

Claim 64 (new) The heat transfer fluid mixture of claim 58 wherein the heavy gas has a concentration ranging from about 1 mole percent to about 99 mole percent.

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Claim 65 (new) A heat transfer fluid mixture consisting essentially of hydrogen and carbon dioxide, wherein the hydrogen has a concentration ranging from about 60 mole percent to about 95 mole percent.